Presentation To
Connecticut Diesel Emissions Control Forum
August 17,2005

Issues and Control Measures Associated With Compression Ignition Engines

Presented by
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Engine Manufacturers Association

- Member Trade Association Representing Manufacturers of Internal Combustion Engines
- Represent Industry on Legislative and Regulatory Matters With Federal, State, Local Government
- Emphasis on Environmental and Emissions Issues

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Presentation Outline

- Emission Reductions from Diesel Engines
- New Engine Emissions Control Issues
- Existing Engine Control Issues
- Recommendations To Reduce Emissions

PM Emissions From Diesel Engines

- Compression ignition engines using diesel fuel are today's power of choice for:
  - Trucks and Buses
  - Construction and Farm Equipment
  - Locomotives
  - Shipping
  - Stationary Power Generation
- Energy Efficient, Reliable, Durable, Cost Effective

PM Emissions From Diesel Engines

- Like other combustion sources compression ignition engines emit PM
- Concerns often expressed regarding diesel engines
  - Health Effects
  - Significant PM Source
  - Uncontrolled Emissions
  - Smoke and Odor
  - NOx and Air Toxics

Diesel Engine Issues

- Health Effects
  - Based on old technology and fuels and questionable studies/source apportionment
- PM Levels
  - Emissions significantly reduced and ambient levels from diesel sources already decreasing
- Uncontrolled Emissions
  - Not True – PM emissions from diesels reduced by 90% since 1980s
- Smoke, Odor, Other Emissions
  - Significantly Reduced as well

Diesel Engine PM Emissions Standards

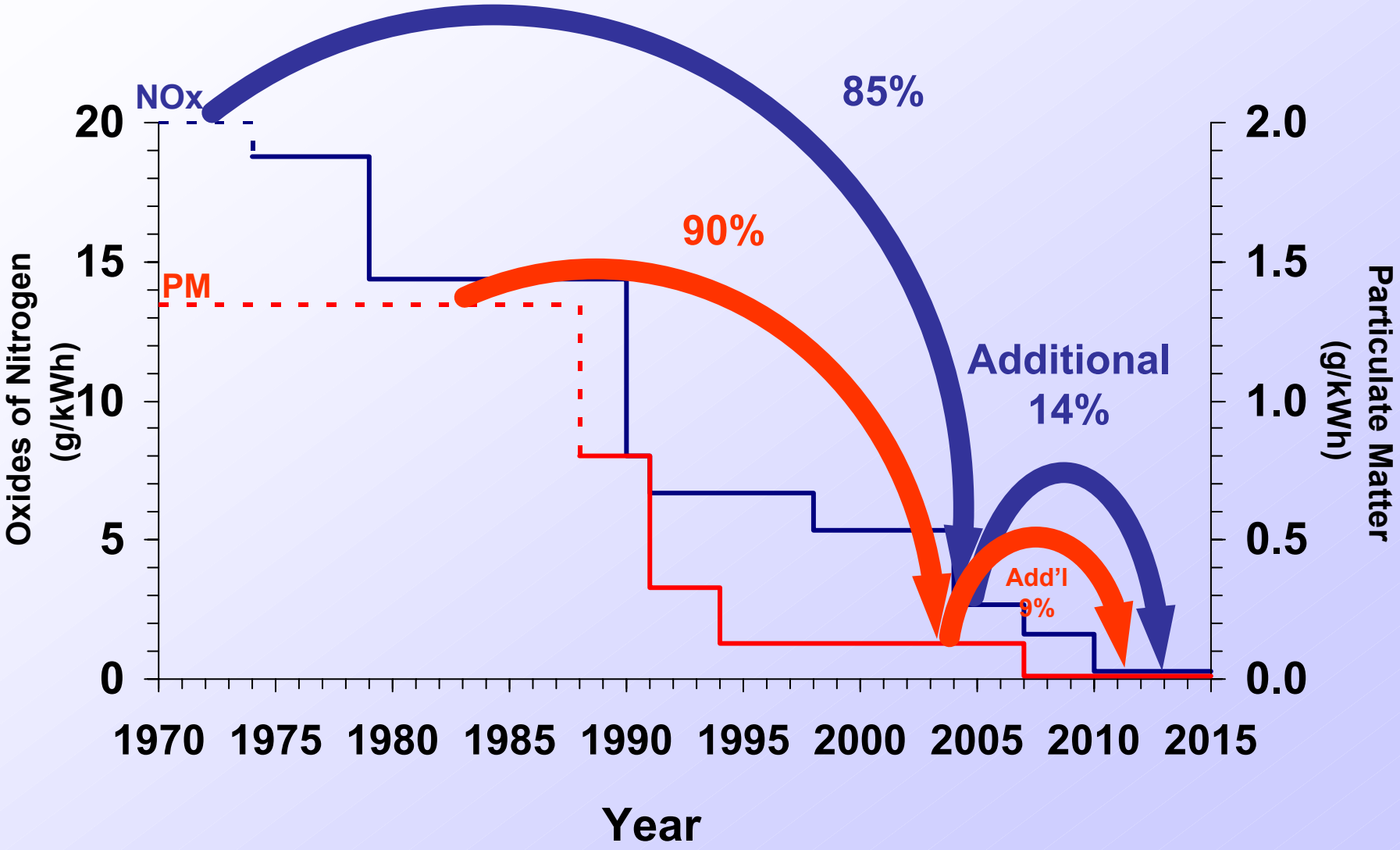
- New Diesel Onroad Engines

1980s	> 1.0 g
1988	0.6 g
1994	0.1 g
2007	0.01 g

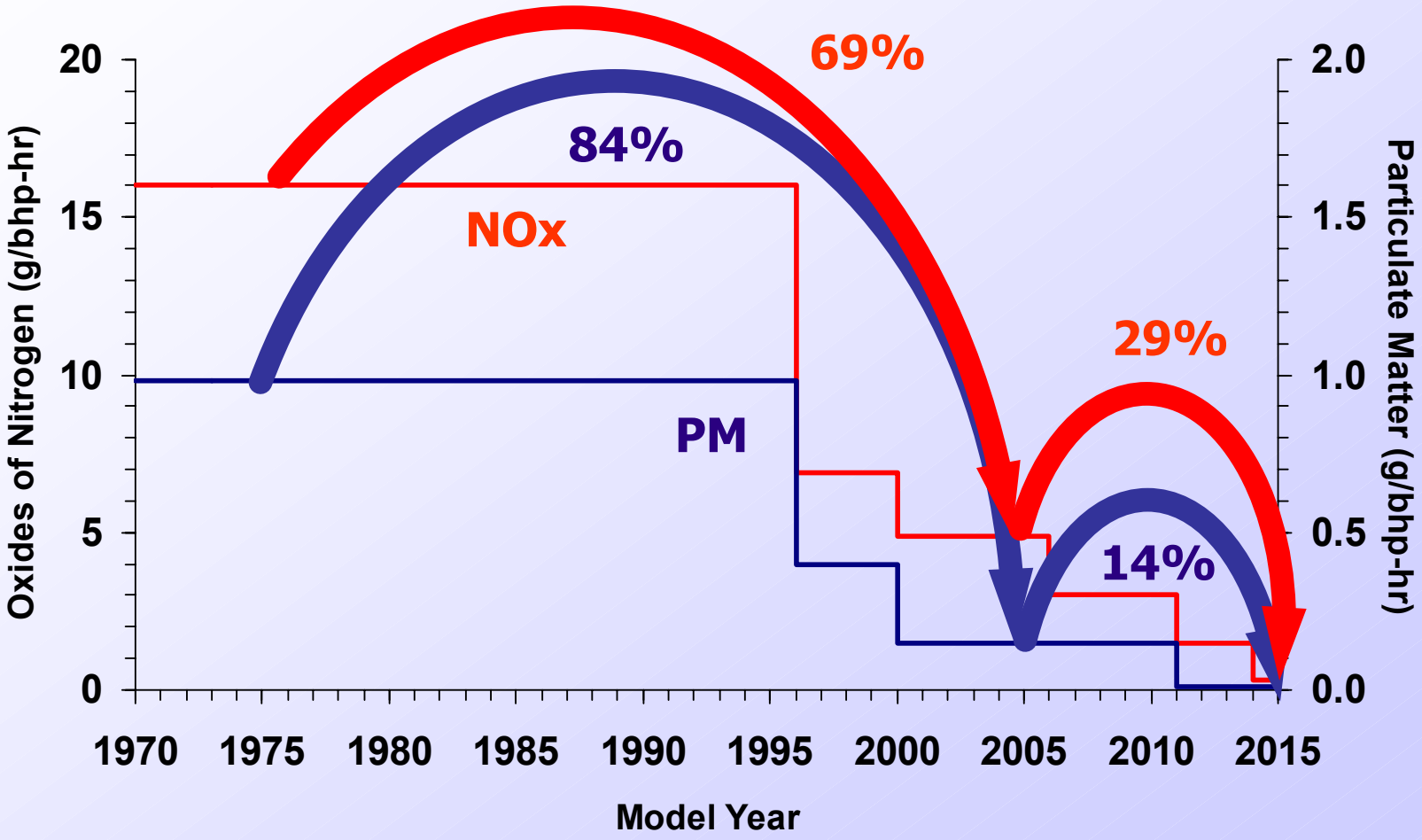
- New Diesel Nonroad Engines

1980s	>1.0 g
1996	0.4 g
2003	0.15 g
2011	0.01 g

US On-Highway Emission Standards



US Nonroad Emission Schedule



Standards and dates vary by power category. Above information applies to an engine rated at 300hp.

New Engine Emissions Controls

- PM reductions through Catalyzed Filters and 15 ppm sulfur diesel fuel
- New engine technologies eliminate PM from diesel engines to near zero levels
- Complete elimination of soot/carbon PM
- Control technology also eliminates hydrocarbon emissions
- NOx technology under development

Good News About New Diesel Engines

- New Diesel Engines virtually eliminate all PM, Hydrocarbons, and Air Toxics
  - 2007 for onroad engines
  - 2011 for nonroad engines
- NOx Emissions reduced by > 90%
- No need for additional controls for new engines

Existing Engine Emissions Issues

- Existing diesel fleets will continue to operate
- Existing Emissions Depend on
  - Age of Engine
  - Applicable Emissions Standards When New
  - Maintenance Practices
- Options Available
  - Vehicle/Equipment Replacement
  - Engine Replacement
  - Retrofit w/ Add-on Controls

Existing Engine Control Basics

- Not all existing engines can be retrofitted
- Proper Low Sulfur Fuel Required
  - ULSD (15 ppm) for PM Filters
- On-road solutions outpace off-road solutions
- One Retrofit solution does not fit all!

On-road Retrofit Considerations

- Engine Age and Baseline Emissions
- Engine Duty Cycle and Exhaust Temperature
- Back Pressure Impacts
- ULSD Fuel Availability and Use
- Engine Mapping and Profile Needed
- Cost-effectiveness

Key Nonroad Retrofit Considerations

- Nonroad Equipment More Problematic
  - Much More Variable
  - Many More Configurations
  - Highly Variable Duty Cycles
- Aftertreatment Technology Less Developed
- Economic Viability of Solutions
- Duty-cycle, Engine mapping, Back Pressure and Fuels Issues

Federal/State Regulatory Controls

- Mobile Source Emissions Regulated Nationally by EPA under Clean Air Act
- Sections 177 and 209 of CAA prohibit states (except CA) from regulating emissions from new vehicles of engines
- States and local governments are preempted from imposing any emissions requirements on mobile sources
- Important that there be a one national set of emissions standards for economic viability

Federal/State Regulatory Controls

- National mobile source emissions standards limits states ability to impose additional controls
- Existing Fleet Retrofit Issues
  - Federal Authority Under Review
  - No State Control of New Vehicles and Engines
  - Key is definition of New under CAA
    - First Rebuild
    - Useful Life
  - Market Participation Exemption

Stationary Diesel Engine Applications

- Diesel engines used to generate electricity in Distributed Generation applications
  - Prime Power
  - Emergency Generators
- Stationary sources regulated by States through application of state emissions standards and permits
- Emergency Standby Engines save lives and regulations should not affect their ability to function as needed

Recommendations to Reduce Emissions

- New Diesel Engines and Vehicles – No Action Needed
- Federal Emissions Standards will reduce emissions to near zero levels

Recommendations to Reduce PM

- States can act to reduce emissions from existing diesel fleets
- Promote and incentivize purchase of new vehicles and equipment
  - Increase Fleet Turnover
  - Incentives to purchase 2007 trucks and buses
  - Grants, tax breaks, other
- Enhanced Maintenance and Inspection Programs

Recommendations to Reduce PM

- Voluntary Incentivized Programs
  - Provide funding for replacements, repowers, and retrofits
  - Recognizes technology differences and availability
  - Maximizes emissions reductions
  - Allows most cost-effective solutions
- Avoid mandatory retrofit programs
- Assure ULSD Fuel Availability
- State Purchase Programs

Key Retrofit/Emissions Reduction Issue

- Funding
- Dollars
- Cash
- Public and Private Owners/Operators Need Economic Incentive to Change
- Some Help is on the way
  - Federal Energy Bill
  - Transportation Bill

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